cent. faster than the central shaft. This outer shaft, by means of friction produced by the pressure of proper springs, carries the nut collar round along with it, except when the escapement-tooth is stopped by either of the pallets attached to the pendulum. A stiff cross piece (like the head of a T), projecting each way from the top of the tubular shaft, carries, hanging down from it, the governing masses of a centrifugal friction governor. These masses are drawn towards the axis by springs, the inner ends of which are acted on by the nut collar, so that the higher or the lower the latter is in its range, the springs pull the masses inwards with less or more force. A fixed metal ring coaxial with the main shaft holds the governing masses in when their centrifugal forces exceed the forces of the springs, and resists the motion by forces of friction increasing approximately in simple proportion to the excess of the speed above that which just balances the forces of the springs. As long as the escapement-tooth is unresisted, the nut collar is carried round with the quicker motion of the outer tubular shaft, and so it *screws upwards,* diminishing the force of the springs. Once every semiperiod of the pendulum it is held back by either pallet, and the nut collar screws *down* as much as it rose during the preceding interval of freedom when the action is regular; and the central or main escapement-shaft turns in the same period as the tooth, being the period of the pendulum. If through increase or diminution of the driving-power, or diminution or increase of the coefficient of friction between the governing masses and the ring on which they press, the shaft tends to turn faster or slower, the nut collar works its way down or up the screw, until the governor is again regulated, and gives the same speed in the altered circumstances. It is easy to arrange that a large amount of regulating power shall be implied in a single turn of the nut collar relatively to the central shaft, and yet that the periodic application and removal of about $\frac{1}{50}$ of this amount in the half period of the pendulum shall cause but a *very small* periodic variation in the speed. The latter important condition is secured by the great moment of inertia of the governing masses themselves round the main shaft. I hope, after a few months' trial, to be able to present a satisfactory report of the performance of the clock now completed according to the principles explained above. As many of the details of execution may become modified after practical trial, it is unnecessary that I should describe them minutely at present. Its general appearance, and the arrangement of its characteristic parts, may be understood from the photograph now laid before the Society.

VII. "On the Effect of Changes of Temperature on the Specific Inductive Capacity of Dielectrics." By Sir W. THOMSON, LL.D., F.R.S.

[The publication of the text of this paper is postponed.]

June 17, 1869.

Lieut.-General SABINE, President, in the Chair.

Mr. J. Ball, Mr. J. N. Lockyer, and Vice-Admiral Sir Spencer Robinson were admitted into the Society.

The following communications were read :—

I. "Note on Professor Sylvester's representation of the Motion of a free rigid Body by that of a material Ellipsoid rolling on a rough Plane." By the Rev. N. M. FERRERS, Fellow and Tutor of Caius College, Cambridge. Communicated by Professor J. J. SYLVESTER. Received May 29, 1869.

(Abstract.)

This paper is intended as a sequel to Professor Sylvester's paper above mentioned, which was published in the Philosophical Transactions for 1866. The notation, so far it differs from Professor Sylvester's, is as follows :—

p is the distance from the centre of the ellipsoid to the rough plane.

λ the (constant) component angular velocity of the ellipsoid about the diameter normal to the rough plane. μ the component angular velocity of the ellipsoid about the diameter parallel to the projection of the instantaneous axis on the rough plane.

h_λ, h_ρ are the component angular momenta about these diameters respectively.

h_t about the diameter at right angles to both.

n the angular velocity, in space, of the plane through the instantaneous axis perpendicular to the rough plane.

Then the mass of the ellipsoid being taken, as in Professor Sylvester's paper, to be unity, it is proved that

$$h_\lambda=(a^2+b^2+c^2-p^2)\lambda-\frac{p^2}{\lambda}\mu^2.$$

The following theorem is then established :—"The component angular momentum of the ellipsoid about any diameter parallel to the rough plane is equal to p, multiplied into the component velocity of the point of contact of the ellipsoid and rough plane, in the direction at right angles to this diameter."

It hence follows that

$$h_t=\frac{p^2}{\lambda}\frac{d\mu}{dt}, \quad h_\rho=\frac{p^2}{\lambda}n\mu,$$

whence it is proved that

$$\mathrm{F}=-2p\frac{d\mu}{dt}=-\frac{2\lambda}{p}h_t,$$

and that

$$P=p\left(\frac{1}{\mu}\frac{d^2\mu}{dt^2}-n^2\right).$$

These results are then reduced into the following form :—

$$P=p\left\{-2\mu^2+(1-\beta\gamma-\gamma\alpha-\alpha\beta)\lambda^2+2\alpha\beta\gamma\frac{\lambda^4}{\mu^2}-\alpha^2\beta^2\gamma^2\frac{\lambda^6}{\mu^4}\right\},$$

$$F=-\frac{2p}{\mu}\{-(\mu^2+\beta\gamma\lambda^2)(\mu^2+\gamma\alpha\lambda^2)(\mu^2+\alpha\beta\lambda^2)\}^{\frac{1}{2}},$$

where α, β, γ are written for $1-\frac{a^2}{p^2}$, $1-\frac{b^2}{p^2}$, $1-\frac{c^2}{p^2}$ respectively.

In the last clause of the paper it is pointed out that Poinsot's "rolling and sliding cone" is a particular case of Professor Sylvester's "correlated and contrarelated bodies."

II. "On the Origin of a Cyclone." By Henry F. Blanford, F.G.S., Meteorological Reporter to the Government of Bengal. Communicated by Dr. T. Thomson. Received May 21, 1869.

It has long been an object to the completion of our knowledge of vortical storms to trace out their early history, and to show, by the comparison of a sufficient number of local observations, by what wind-currents the vortex is generated in each storm-region, and by what agency these currents are directed to the spot at which the storm originates.

With this object in view, I endeavoured, immediately after the great Calcutta storm of the 1st of November 1867, to obtain, through the assistance of Captain Howe (then officiating as Master Attendant of the Port), the logs of as many ships as possible that had been in the Bay of Bengal or anywhere to the north of the Equator during any part of the last week of October. A similar application was made to the Meteorological Department of the Board of Trade and readily granted. The meteorological stations recently established in Bengal, and the observatories of Calcutta and Madras, contributed a number of observations, for the most part fairly trustworthy ; and I was thus placed in possession of data which, although far from sufficient to the complete solution of the problem for the storm in question, have at least enabled me to elucidate its origin to a greater extent than has been accomplished, as far as I am aware, for any previous storm in these seas or elsewhere.

The following Tables give the noon barometric pressures at several stations in Bengal * and on the shores of the bay, and those of a few ships

* These are calculated from the observations at 10 A.M. and 4 P.M., but so regular is